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to commiserate the emaciated appearance of Dr. Hulton. All our friends assembled to see us depart, and accompanied us to the gates of the city, when we bid them farewell, and pursued our way slowly to Mateneh. Our journey to the sea was of course slower than it had been upwards, but on our arrival at Sennif my friend Dr. Hulton was sufficiently strong to travel on the back of a donkey; and in fourteen days from our leaving Şan'á we reached the gates of Mokhá.

Nothing worth notice occurred during our way down, except the demand of a few dollars made by the Arabs as toll for the passage of the escort across the Wádí Şeihán, and the improved appearance of the country, owing to the great fall of rain that had taken place during our residence at Şan'á. We found the ship still anchored at Mokhá, and all our friends very uneasy at our protracted absence. I hoped that the return to the sea would restore Dr. Hulton's health, but it was too late, and he died very shortly after he reached the ship.

In closing this brief Memoir of our journey into Yemen, I can only regret that the task has not fallen into abler hands than mine: I am well aware that an account drawn up by a man of such general attainments, and especially in geology, as Dr. Hulton, would have been far more valuable and satisfactory.

XXII.—*On a New Construction of a Map of a portion of Western Africa, showing the possibility of the Rivers Yeï and Chadda being the Outlet of the Lake Chad.* By Captain W. ALLEN, Royal Navy. Read 25th June, 1838.

THE little knowledge we have gleaned with immense sacrifice, in the interior of Africa, appears still more scanty until brought together and combined; and the isolated relations of individual travellers sometimes contain facts apparently unimportant, and at first sight at variance with others; whereas a careful examination of all the data will frequently reconcile conflicting statements, and by bringing one traveller to the assistance of another, will enable us to throw considerable light on this interesting subject.

Among the desiderata there are two very important points, namely, the verification and connexion of the various geographical positions, and the still unsolved problem of the nature of the lake Chad, as to whether it be a *still water* or have an outlet. These I propose to make the subject of the following paper:—

In the examination of the longitudes of former travellers, it is unfortunate that there are but few data on which to work; and I am obliged to prove the errors of others, from the assumed correctness of my own positions. Having, however, generally been

in a vessel, I had instruments and facilities for astronomical observations, which Captain Clapperton, on whom we depend, could not in his land journeys possess.

From the simplicity of the operation, I conclude his latitudes were all by observation, therefore I shall not interfere with them. But as he expressly says in his first journey from Kukah to Sakatù, that his longitudes are by dead reckoning,* and as I have reason to believe that his others were so, I shall take the liberty of considering them all in the same light.

Although we did not visit the same places, and there are consequently no direct means of comparison between our routes, there is fortunately a sort of connecting point at Kulfu, where he gives the bearings and distance of Rabba, at which place I had very good chronometric observations. He says the latter is three days south of the former; therefore carrying back his distances from the latitude of Kulfu, on the meridian of Rabba, we shall have Bussah in longitude $4^{\circ} 42' E.$

As this differs $1^{\circ} 29'$ from the position of that place on Clapperton's chart, that quantity may be adopted as a correction to all his longitudes. But a portion of this, namely, $51'$, arises from the erroneous position which he assumed for Badagry,† from which place he took his departure; therefore the remainder has arisen, probably from his having over-estimated his distances, an error into which all travellers are liable to fall, and which must increase in proportion to the difficulties and fatigues of the journey. If this principle be admitted, it will be necessary to apply a second correction, in the ratio of the excess of the distance, between the known points Badagry and Bussah. However, as it seems unreasonable to suppose that he always committed an error of equal amount, I would propose to take a mean between the *constant* and the *increasing* corrections. Then the longitudes will be as follow:—

Bussah	$4^{\circ} 42' E.$
Womba	5 49
Guari	6 26
Zaria	7 4
Bebeji	7 37
Kano	7 44
Sakatù	4 38
Katagùm	9 16
Kukah	12 34

It is impossible to make use of the distances given in itineraries, unless we have some data by which to estimate a day's march. This will vary according to circumstances, and there must be a considerable difference between a Kàfilah journey and that of a

* Denham and Clapperton's 2nd edition, vol. ii. pp. 220 and 251.

† Properly Badaghi.—*Vide* Robertson, notes on Africa, p. 283.

messenger. When the distance is given between cities not very remote, and having from their importance frequent communication, I think the latter ought to be calculated on, and might be taken at twenty-five miles. By adopting this in the distance between Rabba and Kulfu, it would place the latter more to the north, and within the distance of two days of Yáuri, as given by the Landers; otherwise two days would bring Yáuri too much south, and too near Bussah, to agree with the time they took in passing between those cities.

The distance from Bussah to Rabba, the Landers say is seven days by land and four by water. I presume the land journey is through Kulfu.

Both at Sakatù and Yáuri, the distance between these cities is said to be five days. This, if we take the messenger-day of twenty-five miles, will agree very nearly with the position of the former city, by Clapperton's latitude and his corrected longitude, and gives 10·8 miles per day for the distance to Kano, which is, perhaps, enough for horizontal distance, considering that the route is difficult and circuitous. This journey between Sakatù and Kano was performed three times, each in about seventeen days.

On his first expedition, travelling between Bornù and Sakatù, Clapperton takes his departure from a lunar observation* at Kuka; but he neither gives the data, nor mentions his having taken such an observation at that place. Now, as in coming westward, he falls short of the position I have assigned to Kano, by his longitude corrected from Bussah, either he or I must be wrong; but as the estimated distance generally exceeds the true instead of falling short, the presumption is that the lunar observation places Kukah too far to the eastward. It is therefore better, perhaps, to reject it altogether, and assume a position for Kukah, by carrying back his itinerary from the corrected longitude of Kano.

Thus I leave Clapperton's map untouched, with the exception of bringing his longitudes a little more to the westward. The case is very different, however, with respect to Lander's itinerary between Kano and Danrorah, after the unfortunate death of his master. This has been so erroneously laid down, that the latter place falls within thirty-five miles of Fandah, from which he was informed that he was then distant twelve or thirteen days.† This route must, therefore, be altered entirely, which the data enable me to do with considerable precision; and it will be checked by the reported distance of Danrorah from Fandah, and of Jakobah from Dagbòh.

* Denham and Clapperton, vol. ii. p. 251.

† I cannot ascertain how or by whom this itinerary was laid down, but the position of Fandah was not at that time ascertained.

Lander went from Bebeji to Kuttup, and returned to Zaria; thus making a triangle, of which the first and last places at the base are known;* and Kuttup, which is three days short of Danrorah, is at the apex. I have very carefully estimated the distances on the routes to and from Kuttup, from the hours which he gives, leaving out of the question his vague courses, and I find, after making proper allowance for winding, they are about 120 miles each: these, therefore, form the legs of an isosceles triangle, and their intersection points out the position of Kuttup. To the remainder of the journey of three days to Danrorah, I have given an analogous direction, which agrees with Lander's reported distance of Fandah, and mine between Dagboh and Jakobah: Danrorah is half a day from the latter place, which lies probably in lat. $9^{\circ} 30' \text{ N.}$ and long. $9^{\circ} 26' \text{ E.}$

This corrected map of Lander's journey, viewed conjointly with that of Clapperton, which it nearly joins, reveals a remarkable and highly important feature; namely, the almost uninterrupted continuance of a valley between the lake Chad and Jakobah, in the neighbourhood of which city flows the river Chadda. This leads me to the second part of my subject, the nature of the lake Chad. I approach it with great timidity and caution, as I am aware that very different views of the subject have been hitherto entertained by many able geographers.

Major Rennell was of opinion, that not only the waters which descend from the mountains of the moon, but the outpourings of the mighty Niger, Jalibà, or Kwara, may be evaporated, from the low and extensive morass in which he supposed them to terminate. The hypothesis of Major Rennell, for whose sagacity I entertain the highest veneration, would never have been proposed but for the imperfection of the materials on which he had to work: and the discovery of the outlet of the Kwara or Jalibà completely subverted it, and proved at the same time how vague were the ideas of the Arabian geographers respecting the interior of Africa.

My rejection of that hypothesis therefore will not be deemed presumptuous, especially as so able a geographer as M. Reichard, of Lobenstein,† had, as early as 1802, assigned very strong reasons for supposing that the outlet of the Jalibà would be found in the Bight of Benin. The discovery of the large lake or inland sea by Denham and Clapperton seems at first to support this theory, especially if it has, as the former believed, no outlet; but by giving an approximation of the size of the lake, Denham has shown how small that reservoir is, compared with the volume of water discharged into it. The Caspian, for instance, receiving

* By Clapperton's latitude and longitude.

† Von Zach, *Monatliche Correspondenz*, May, 1802.

the drainings of a comparatively low range of mountains, has a surface of more than 10° by 3° in breadth. The Chad is only about 3° in length, and receives the deluge of tropical rains, from a range 25° in extent, and doubtless higher than the snow-capped mountains of Abyssinia, since the principal branch of the Nile takes its rise in the eastern side of the same lofty range, the Kumri,* or mountains of the moon, or as Sultàn Bellò says, *ninety-nine* mountains all of them beginning with the letter F.

It is true the lake Chad is not the only receptacle; we have reports of the lake Fitri, and there are, perhaps, many others: but we may presume from the alluvial nature of the whole of that vast tract, that they are merely inundations of the low land; and even the permanent lakes are but slight depressions of soil, and may have no great depth. In the next place, we have now positive proof of the existence of a large river, the Chadda, flowing from the east, and uniting with the Kwara from the west, which it certainly rivals, if it does not surpass it in magnificence; having much greater average breadth, although I believe the depth in general to be less. This magnitude implies a proportionate length of course, and if it do not pass through the lake Chad, it must have its sources far away to the east, in some of the *ninety-nine* mountains. The Mendefi range seen by Denham is not sufficiently remote or lofty to be the parent of the *whole* of such a stream; yet it would lie right in its course, especially if the slope on the southern side be as extensive as that on the north, which Denham found to be 100 miles. The mountain may, however, be volcanic, of which there is very great probability:† in that case it may rise abruptly on the south side, from the alluvial or river level, and allow the Chadda to sweep round its base. This course indeed Denham gives it, from the accounts of the natives, but he joins it with the Shari, thus making the stream flow in opposite directions at the same time.

Again, Denham assures us that the water is fresh; he says frequently "it is very sweet and pleasant."‡ Although instances have been given of lakes without outlets being sweet, I doubt if these be well established; and the contrary is certainly the received opinion.

Lastly, the river Chadda is very clear compared with the

* Properly Jibâlu-l-Kumra, *i. e.*, the Blue Mountains, though the original name was doubtless Jibâlu-l-Ķamari, "the lunar mountains," as the Arabs derived their knowledge of this part of Africa from Ptolemy, who calls the whole range "the mountains of the moon."—(Geogr., p. 115.) S.

† The corrected position of the highest point of the Mendefi range falls exactly on the line of the volcanic elevations in the Atlantic of St. Helena, Anno-Bom, St. Thomas's, Fernando Po, and Camaroons Mountain, an extent of more than 1500 miles.

‡ Denham and Clapperton, vol. i. p. 64.

Kwara. This is rarely the case with mountain streams; but as with the Rhône, the Rhine, &c., &c., it is always the consequence of having passed through a lake, where the almost stagnant waters have time and space to deposit the débris from the mountainous regions, with which they were charged. Indeed the Chadda was so clear, that the men drank its water from alongside, after letting it stand a little while; it was remarkably "sweet and pleasant." While in the Kwara we drank the water which had been suffered to cool and settle in the boiler. The Chadda began to rise a little earlier in the season than the Kwara, but this must be the case whether it pass through the lake or not, since it must have its feeders in the Kumri mountains, many degrees to the south of the sources of its rival, and therefore must begin to fill a little sooner and faster, but not much, otherwise the rivers would have different levels at their confluence.

If the fact mentioned by Mr. Laird, that the water of the Chadda is colder than that of the Kwara, was the result of comparative experiment, and not depending on the fallacious evidence of the senses, I cannot admit it to be a proof that the whole stream is direct from the mountains, without having been delayed in its course by being spread into a lake.

I made experiments in the Kwara only, but my self-registering thermometer failed, as the quicksilver passed the index every time. This however was sufficient to prove that the water at the bottom was at a much lower temperature than at the surface.

These are the circumstances which have led me to the belief of the identity of the Chad and the Chadda, or more explicitly, of the lake and river. I shall, I trust, bring forward some strong evidence in my support, and will honestly state the arguments on the opposite side of the question, as they appear principally in Denham's assertion, and the implied belief of Clapperton. They however were pre-occupied with one idea, and thus easily satisfied themselves that they had proved it. I thought at the outset of this inquiry, that I should be able merely to bring forward some plausible reasons in support of my opinion, but as I advance, I find the evidence crowding so closely on me, that I hope to be able to prove, not only that the alluvial or river level can be traced from the lake Chad, nearly to the part of the Chadda which I was able to reach; but that with a few breaks, I can show the continuity of the river for nearly the whole of that distance.

The similarity of the names has led others, as well as myself, to look to the Shari* of Denham as the outlet of the lake, notwith-

* Shárá, if Arabic, would signify glittering, an epithet often applied to a large body of water; but the name may be a Bornuese word, and it may have been incorrectly expressed.—S.

standing his assertion to the contrary, and I confess I began this inquiry, with the hope of finding in his description some circumstances from which I might draw a fair presumption of the possibility of his having been mistaken in the direction of the current of that river. Those who know the difficulties under which travellers in general labour, and how truly they are multiplied an hundred-fold to the African traveller, will not be surprised at my imagining him to have fallen into such an error. For myself, if I succeed in proving my proposition, I shall consider that I have made a greater discovery in Africa within my closet, than while personally labouring on the spot.

The consequence, however, of an attentive reading of the account, which I had in some measure forgotten, was, that I very soon perceived the necessity of abandoning all idea of drawing off the water of the lake by that channel. Nothing can be more conclusive or circumstantial than Denham's description. He saw the river and crossed it at several points, and not only assures us that the current runs past Loggùn and Showi with considerable rapidity *towards* the lake, but having gone *with* the stream in a canoe as far as its entrance to "that sea of fresh water," he speaks of the difficulty of paddling *against* the current on his way back.* He also describes the water as discharging itself by several branches, and that it consequently forms a *Delta*.

We have also a confirmation of the northerly course of this river, from the account received at Sakatù by Clapperton; who was told that it is only four feet deep above Loggùn, before it is joined by the Asha, which comes from the east through Bagermi.† The Shari doubtless has its origin in the Mendefi range to the south-west.

Having thus disposed of the Shari, I feared that I should be obliged to give up the tribute of the ninety-nine mountains to the effect of the sun's rays, very much wondering nevertheless, how he would dispose of such a vast body of water, if once raised into vapour, except by letting it fall again on the surface of the lake in the shape of dews; and every one knows the dampness of the African climate, which causes the finest steel to rust in a very short time.

However, a new light broke in upon me in the course of my investigation. Soon after the first arrival of the travellers on the borders of the lake, they came, says Denham, "to a very considerable stream called the Yeú; in some parts more than fifty yards wide, with a fine hard sandy bottom, and banks nearly perpendicular; and with a strong current running three miles and a half to the eastward. As I expected, every one of the Arabs said this was the Nile, and that it ran into the great water the

* Denham, vol. ii. p. 6 and 7.

† Clapperton, vol. i. p. 30.

Chad. It is sometimes double the width and a great deal deeper. The air from a running stream of CLEAR water, and the freshness it imparted to all around, was such a relief, after a march through sandy deserts, that both man and beast were in a manner renovated by its effects. The men, and even the women, bathed and washed, and the negroes swam all the horses." The principal feature in this description is the *clearness* of the water. It struck me very forcibly as an anomaly, although he says also that the Shari was clear at its embouchure; but this is incompatible with the formation of a Delta, and of the fact which he relates of its bearing on its bosom floating islands, &c., and I supposed this must be the outlet I sought for; upon very slight grounds it may be thought, but I must request that judgment may be suspended, while I lead up to my hypothesis, by referring to the authority of travellers from all parts of the continent, and in all times, up to our own enterprising countrymen, who have trodden the very ground. If I were to quote all the writers who throw light on this interesting question, I should swell my paper unnecessarily, since it has been already done by far abler hands. It will be sufficient for my purpose if I observe, that the accounts of the ancients of a great central river, traversing Africa from the west, were confounded with those of the Arabian geographers of the middle ages, who all spoke of a large river flowing from the east. They were considered as identical; but the ocular testimony of Mungo Park having been received as confirmation of that of Herodotus, it was immediately concluded that Africa could not be traversed otherwise than from west to east; and the Arabians were thrown into discredit. Deceived by the generic terms applied to both the rivers of the negroes,—by the transmission of the description through the natives, who doubtless consider the direction of rivers with reference to their own journeys, and independently of the current,—and by the universal belief of the communication with some great central lake, these accounts have been considered as relating to one and the same river, until the discovery of an intermediate outlet has shown the possibility of the continent's being traversed by streams from opposite sources.

Justice, however, has not been sufficiently done to the Arabian writers; and I hope to be able to prove, that their account of the eastern *Nil el 'Abid*, or river of the Negroes, is nearer to the truth than has been generally imagined.

Idrisi,* Abulfeda, Leo Africanus, &c., all speak of the westerly course of this river. The former† says that it forms an island at all times of the year, 300 miles long by 150 in breadth, which is

* Jaubert's Idrisi, p. 13.

† Jaubert's Idrisi, p. 18; also Major Rennell, in the Proceedings of the African Society.

inundated during the rainy season; consequently, the whole of that tract is alluvial, and agrees remarkably well with Clapperton's description of it.*

They all show the drainage of the western side of the mountains, where the Nile of Egypt has its source, by a large river flowing to the westward, and communicating with the river of Tumbuktù; though their reports are vitiated by having put forth their opinion that there was also communication with the river of Egypt. Still they may have been misunderstood from the application of the generic term Nil to the three streams.

Modern discovery has proved them in the main to be right. While Mr. Lucas was collecting information in Africa from the Sherif Imhammed, a native of Fezzan, relative to the countries of Sudán, Bornù, and Kashnah, with which he was said to be perfectly well acquainted, information equally valuable was obtained in England from Ben Ali, a native of Marocco, of the same countries, which he also had visited. As they agree in the most important particulars, they may be taken as very good authority.

In speaking of the great river which in Arabic is sometimes called Nil el Kibir, or the Great Nile, and sometimes Nil el 'Abíd, or the Nile of the Slaves, they say,† “ Its rise and termination are unknown, but its course is *from east to west*. So great is the rapidity with which it traverses the empire of Kashnah that no vessel can ascend its stream; and such is the want of skill, or such the absence of commercial inducements among the inhabitants of its borders, that even with the current neither boats nor vessels are seen to navigate.‡ In one place, indeed, the traveller finds accommodation for the passage of himself and his goods, but even then, though the ferrymen, by the indulgence of the Sultan of Kashnah, are exempted from all taxes, the boat which conveys the merchandise is nothing more than an ill-constructed raft, &c.” “ The depth of the stream, which is more than 100 miles to the south of the city of Kashna, the capital of the empire of that name, is estimated at twenty-three or twenty-four feet English. Its width is such that at the island of Gongo,§ where the ferrymen reside, the sound of the loudest voice from the northern shore is scarcely heard.”

“ Having passed the stream, the face of the country, and with it, the mode of travelling are changed. High mountains and

* Denham and Clapperton, vol. i. p. 81.

† Mr. Lucas's communications, *Proceedings of the African Association*, vol. i. p. 123.

‡ This is precisely the case on the Chadda at the present day; but Denham says that in the former Sultan's time there were many canoes trafficking on the river Yéú near Kabuhari.

§ Gongo or Gondo means island in the Hausa language.

narrow valleys, extensive woods and miry roads, succeed to the vast plains and sandy soils of the Zahara* and its neighbouring kingdoms. No camels are found; their place is supplied by small horses, asses, and mules."† The country of Kashnah, properly speaking, "is bounded on the north by the mountains of Eyre,‡ and by one of the districts of the great Zahara; on the south by the (great river) Niger, and on the east by the empire of Bornù and the kingdom of Zamphara.§ The capital is five days north of the Niger."||

Hornemann's notices are pretty correct, except that he considers that there is but one stream, having in all its course a current running in the same direction as that of the river of Tumbuktù, or from west to east. He says,¶ "The river which was seen by Mr. Park waters Nyffe and Cabi, where it is called Gulbi, and in Haussa Gaora, (Kwara), runs eastward into these districts of Bornù, where it takes the name of Zad; all these names mean the *great water*. It is a very large river. The breadth of the Zad was given me for one mile, others said two, but in the rainy season the breadth is said to be a day's journey (*i. e.* eight hours). The Bidumas** always keep in the middle of the stream. They are a very savage, heathenish nation."

Hornemann's distance from Kashnah to Bornù, 330 miles, agrees very well with Clapperton's.†† His supposition of the easterly current may be explained from his considering it to be a continuation of the river of Tumbuktù; and as I said before, from the probability that his native informant referred to the trending of its banks in the same direction as his journey, rather than to the course of its current.

In the Journal of the Arts and Sciences for 1823, an account is given by an officer at Sierra Leone (Major Laing), of the journey of a Mohammedan named Mohammed Misrah,‡‡ from Alexandria through Súdán and the countries in question. His testimony is of a varied nature, making both for and against my hypothesis, although it can have but little weight either way.

* Sahrá, *i. e.*, Desert.—S.

† Lucas's information, Proc. Afr. Ass., vol. i. p. 118. Idrisi, p. 15, says they have camels in the country of Lemlem.

‡ Eyres, *i. e.*, Aurás, the mountains on the south side of Fezzan.

§ Zanlárah of Idrisi.—S.

|| The sheriff does not describe the western limit, but it is evident that it ought to be Zamfara, and the word is misplaced, as, according to Clapperton, Zamfra, of which Zirmi is the capital, lies to the west of Kashnah.

¶ Hornemann's notices, Proc. Afr. Ass., vol. ii., p. 201.

** Bidoomahs of Denham and Clapperton.

†† Clapperton was thirty-six days one way and thirty-seven the other between Kuka and Kano; Idrisi gives thirty-six days as the distance between Kauga and Ghanah. But in countries where the frequent wars cause not only the destruction of cities but the depopulation of whole districts, names are probably of little duration, or may be as migratory as the inhabitants.

‡‡ Probably Misir, *i. e.*, Egyptian.

He says, that he had conversed with people who had travelled from Nufi to Sennár, along the banks of a very broad river, which frequently overflows its banks, inundating the country to an immense extent; but he positively believes this river to be a link of communication between the Niger and the Nile, calling it the *Bahr el 'Abid*. He asserts, on the other hand, that he has made the circuit of the lake Fitri, which he declares has no outlet, although it receives a large river 400 yards wide at its embouchure. He says, at the distance of ten days south from Bornù, the *Jalibà* flows through the *Kafir** country, where it is known by another name; that there is no river of any consequence within that distance of Bornù, although he must have passed the *Asha*, the *Shari*, and subsequently the *Yéú*. His accounts of distances prove that his memory was not always faithful. From Bornù *Biriní* to *Kano*, he gives only ten days; *Idrisí* gives thirty-six, as well as *Clapperton*, and *Hornemann* says 330 miles. *Mohammed's* testimony is therefore entitled to little credence in the details, although it is evident he had travelled through the countries he describes. There is something like evidence to be gleaned from *Sultàn Bellò's* almost unintelligible account of the countries of *Súdán*, given in the Appendix to *Clapperton's* journal.† The river *Baku* is described as larger than the *Kwara*. The relative positions of the rivers are, the *Kwara* in the west, the *Kaduna* in the centre, and the *Baku* or *Jaku*‡ to the east. The people of *Nifi* are said to have come originally from *Kashnah*, and their prince from *Atághér*. “He first conquered the territory of *Bení*, from the river called *Bakú* to that which is named *Kaduna*, &c.; he then embarked on the *Kwara*, &c.” Mention is made of an eastern *Kwara*, and again, “the river of *Kwara* runs through mountains &c., and issues from the mountains of the moon, &c.” This is a very consistent description of a river, such as I have attempted to trace from the lake *Chad*: the river *Chadda* in fact, which like the *Baku*, is larger than the *Kwara*.

Thus we have very strong presumptive evidence from the Arabian geographers and from native travellers, of the existence of an immense river, running through the countries of *Bornù*, *Wankarah*, and *Haussa*, &c., “100 miles south of the empire of *Kashnah*,” with almost unvarying assertions of its course being from the east towards the west, and having its sources in the same mountains which gave birth to the *Bahr el Abyad*, its origin being clearly pointed out by *Mr. Brown* as the *Misselád*. In *Súdán* it is not a mere mountain torrent, but a mighty stream, at the common river or alluvial level, which is proved by its overflowing its banks for more than 300 miles. If this stream flows

* *Kafir*, i. e., Infidel.
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† Pages 339, 340.

‡ The *Girkwa* of *Clapperton* (?).

from the east, it cannot terminate in Wankarah, since, according to Idrísí, it retires to its bed after the inundations, and is a river at all times.* Neither if it flow *towards* the east, can it have its sources in the mountains to the west, which have but little elevation, and could not furnish such a stream. Still less can it flow in the region of the south, distinct from the Chadda, by which that region is known to be occupied. It only remains to examine the more important information which we derive from those who have gone over the very ground, who have travelled on the banks, and who have crossed and recrossed the river in question, at many points of its course between Bornù and Haussa, and even to the basin of the river Chadda, and if by their means, leaving out for the present their opinion of the direction of the current, I can trace the continuity of the river level, I think no one will deny the identity of the streams.

In the month of December Dr. Oudney and Captain Clapperton commenced a journey into Sudán from Kukah, having joined a káfilah of twenty-seven Arabs and fifty Bornuese.

The low country was still inundated by the overflowing of the Yeú; although the river had fallen about six feet.† In what Clapperton calls temporary rivers, formed by the overflowing of the Yeú during the wet season, there was still a considerable body of water, running at the rate of two or three knots.‡ We may imagine the main stream to be of great magnitude, when it required a whole day, and considerable difficulty, for the káfilah to cross what is described as an inferior or “temporary” branch. It must have been deep, as they were obliged at Dammasak to cross on rafts,§ made of bundles of reeds laid on two poles; and the camels swam over. They continued “winding along the banks of the river, or occasionally cutting off a bend by a cross-path.” Near the lake Tumbum, the country to the S.W. as far as the eye could reach, was a dismal swamp.|| Skirting this the travellers arrived at Bede-guna, near the swollen river they had crossed on rafts at Dammasak. The country S.E. and S.W.¶ was an entire swamp. The lake Zumbum is twelve miles S.S.W. from Bede-guna. From this place they continued to travel over a level country, sometimes by the borders of the Yeú; which at one place is** said to be 150 yards wide, but nearly dry. “Its waters were dull and sluggish as far as we observed; and during the middle of the dry season, the naked channel and a few pools

* Idrísí, p. 18.

† Denham and Clapperton, vol. ii, p. 188.

‡ He does not say in which direction.

§ As described by Imhammed, Proc. Afr. Ass., vol. i. p. 123.

|| Ibid., vol. ii. p. 199.

¶ In this direction Idrísí places the town of Gharbíl at the foot of a mountain and on the bank of the *Níle*.

** Ibid., vol. ii. p. 210.

of water, sometimes far apart, are all that remain of the river." "This may be taken as a fair average breadth *downwards* as far as the lake, where however the depth seemed considerably increased."* This is within a quarter of a mile of the city of Katagúm.

After leaving this, the road was along a large swamp to the south, and a branch was twice passed which Clapperton calls the Shashum, a narrow stream falling into the Yeú: I imagine it, however, to be another sub-division of its waters. By Clapperton's map a large arm branches off at Old Birni, and passes Bede-guna; where it is said not to dry up throughout the whole year.† Another arm branches to the south at Katagúm; thus completely answering to the description of Idrisi, that the river surrounds and intersects the country of Wankarah.

A day's journey further, Clapperton says, "Since leaving the wells of Beere-Kashifery on the southern borders of the great desert, we had not met with rocks, or even pebbles; till now, the very channels of the rivers being destitute of stones; the whole country consisting of soft alluvial clay."‡ He now (at Katungwa) saw a range of low rocky hills stretching nearly south-west, called in the Hausa language Dushi, or the rocks. Zangeia is situated near the extremity of this range. "The prospect to the south is bounded by high blue mountains." After this our traveller found the country diversified by hill and dale. A range of hills south-west, called Dull, about 600 or 700 feet high, running nearly north and south. Some rocky streams, the Girkwa and Sokwa, rising in these mountains, are passed before arriving at Kano; which I conjecture from the context to be on an elevated plain. After this place, Zangeia, he passed over a range of hills or mountains separating the basin of the Yeú from those of Guber and Guari, where it is not to our purpose to follow him; thus far, however, he had been travelling on an uninterrupted alluvial level, overflowed and intersected in many places by a large river. It is fortunate that very near this spot, Lander passed in an endeavour to reach Fandah, after the death of his master; and on his return to Zaria, from within half a day of Jakobah, he also traced an extensive alluvial level, occupied by a large river or rivers. This level or valley is clearly defined by the mountains of Zaria and Guari on the west, and on the east by the blue mountains seen by Clapperton and Lander. But to explain this clearly, it will be better to commence with his itinerary at Bebeji;§ which I have before mentioned as a known starting point. After passing the hills which Clapperton in his first journey calls Dushi, a generic term, and in his second Nora, on the third day he

* Denham and Clapperton, vol. ii. p. 222.

† Vol. ii. p. 203.

‡ Vol. ii. p. 231.

§ Page 288.

crossed a large river, and two small ones, running westerly, near Karifo.* His route then was at the base of a long range of mountains stretching southerly, the blue mountains which Clapperton saw to the south at Zangeia. He marched continually over rocky and hilly ground until he reached Kuttup, crossing several large streams† running to the westward, one of which he calls the Kudúnia. After leaving Kuttup,‡ he crossed a large river, the Rari, flowing to the south-east, then traversing the rocky ridge on the opposite side of the valley, he arrived at Dan-rorah. From one of these heights, he had the prospect of an extensive plain, of several days' journey before him. Here he was obliged to turn back, but he obtained a sort of connecting point, for he was told that the city of Jakobah was at the foot of a large hill, which he saw at the distance of half a day to the eastward.§ On his return he does not mention the passage of the river Rari again, but he must have crossed it as he re-visited Kuttup. This city he describes as situated in a beautiful plain. From thence he took a route more to the westward, and at a regular ferry he re-crossed the Kudúnia, or a river so much broader, and deeper, and more rapid, than he saw before, that he had great difficulty in passing it.|| Continuing to travel in a *plain*, he crossed and re-crossed a large "*noble*" river running to the south;¶ and after passing the town of Eggebee, the situation of which in a beautiful and *extensive plain* he describes with very glowing colours, he arrives at the city of Zaria, which is situated on the north-east side of the mountain pass from Nufi; the range which separates the valley of Wankarah** from that of Guari and Koton Kora. On the west a part of the same elevation he also saw at Accoran.††

Here is the alluvial level, clearly traced in the return from Kuttup all the way to Eggebee, where the plain, extending "many miles," may easily be supposed to reach Karifo,‡‡ from which it cannot be very *many miles*. The course of a "*noble, deep, broad, and rapid river*," has also been marked out; having been crossed and re-crossed in such a manner as to leave no doubt of its identity. Since they flow in the same alluvial level I presume there will be no difficulty in joining the "*westerly streams*," crossed near Karifo with the "*noble*" southerly river,

* Clapperton's Second Expedition, p. 289.

† These must be tributaries from the Mandara range.

‡ Page 296.

§ Page 297. This resembles Idrisi's description of Mellel, in the Lemlem country. Lander says Jakobah is the capital of the Yem Yem country.

|| Page 299.

¶ Pages 302, 303, &c., Second Edition, vol. ii. p. 140.

** Page 149.

†† Page 301.

‡‡ Carifo in the map annexed to Clapperton's Travels.

two miles east of Eggebee, with the, "large southerly river" requiring a ferry, a quarter of a mile west of Makami, with the "deep, broad, and rapid" Kudúnia,* and with the "large" south-easterly river Rari.

It now only remains to unite the Yeú or Shashum with the Karifo stream, towards which it is directed in Clapperton's map, and the Chadda with the Rari. If the contiguity of such large rivers, apparently without the intervention of high land, be not thought sufficient evidence, I can bring the report of many natives, independently of each other, given at various places, but nearly all within the tract of country of which we have been treating.

1st. Captain Clapperton was informed, both at Bedeguna and Katagúm, on the Yeú, that this river had its rise among rocky hills in the country of Boushi, near Jakobah and Adamawa.†

2nd. At Girkwa,‡ he was told by a black sherif that he would cross on the following day a river communicating between the Kwara and the Yeú.§ The captain did not believe this report, probably from some mis-statement of it.

3rd. Lander was told at Danrorah, by his servant Mohammed, that "a river called Shar or Sharra, deriving its source from a lake Chad, flows about half a mile from Jakobah; and that canoes can be paddled from the said lake to the Niger at any season of the year."¶

4th. Lander at the ferry above Bussah, when making some allusion to the river,—“A Felatah came forward and made the extraordinary assertion, that instead of running to Fandah it took a turn to the eastward, and disembogued itself in the lake Chad in Bornú.”¶

5th. Mr. Laird made many inquiries at Fandah about the course of the Shari. “The answers invariably were, that it came from Lake Chad; and one man, a native of Kukah, offered to take me up there in twelve days, without changing the canoe.”**

6th. I was myself informed at Dagbóh, on the Chadda, “that Jakobah was seven days higher up the river; and the city of Kukah, in Bornú, is said to be only six days, for canoes, above Jakobah, on the same river.”

7th. Lander told me at the same place that he had received information from natives, which I did not hear, that one could go

* I allude to the second river which he calls by this name; I conceive the first to be a mountain stream, falling into the large river. The name is common to other streams, and to towns. Clapperton mentions one of each; and Lander, having heard of a river of that name when he descended the Kwara, thought it was the same he saw in Wankarah, and they have been made to join in the map of his route. The butter-tree is called in Hausa Maï Kadanía.

† Den. and Clapp. 8vo, pp. 202 and 222.

‡ Qu. Jaku of Bello. See Appendix to Clapp.'s Journal, p. 329.

§ Id. p. 236.

¶ Clapp. 4to, p. 297.

¶ Lander's Voyage, ii. 97.

** Laird and Oldfield, i, 232

up the Chadda, from Jakobah on “*one water*” to the great water of Chad. Indeed he affirmed that he had information from various quarters that this noble river is the outlet of that immense lake.

8th. Lander says that at Wawaw “the king’s head drummer, a Nufi man, stated, in answer to our inquiries, that the Chadda, Shari, flows into the Niger at Fandah; and a regular intercourse is kept up with the natives on its banks, for the purposes of trade, by means of very large canoes. The sheikh, he said, resided very near the Chadda, which in Bornù spreads into a large body of water.

Lastly. He was told that the Kudúnia falls into the Niger near Fandah; that is, the river which he had crossed so frequently in the Boushi country, which passes near Jakobah, which is the same as the Chadda, according to my information, and which comes from a lake Chad, according to Mohammed, Lander’s servant.

I will now bring forward, and endeavour to combat, Denham’s evidence on the other side of the question; no easy task, it would appear at first sight, since he is very circumstantial, and evidently intends to record his opinion that the lake has no outlet. But, as I said before, the difficulties he had to contend with must be taken into consideration, especially as he had to do with a very winding river, and therefore might easily be mistaken in its course. On the 24th of May, he came to the Yeú at Lada, 70 miles from Kuka,* where he says, “The river here makes a bend resembling the letter S; the water is extremely shallow, and a dry path over the bed of the river appeared close to our halting-place, although the banks were high, and capable of containing a very large stream. I walked out, following the *easterly* course of the stream, in search of game; but within four hundred yards of the river the ground was so choked with high grass and prickly under-wood that I was obliged to take a path more inland.” He passed a great many small lakes in the vicinity of the river; one was very deep, containing hippopotami in great numbers. From the ruins of the walls of old Birni “we obtained a sight of the river Gambarú,† running nearly east, notwithstanding its *windings*, and only a few miles distant.” Again—“We came to the river, which is here a very noble stream, nearly a quarter of a mile in breadth, and situated between two high banks thickly overgrown with jungle, bushes, and bamboo. We endeavoured to ascertain if there was any current; but the water appeared *perfectly stationary*. Omar Gana, however, and the shouas who had accompanied us, were unanimous in declaring that after the rains a very strong current from west to east constantly flowed.”

* Denham, i. 206.

† Den, vol. i. 212.

Again—"We followed the course of the river to the eastward (which he in another place calls the Yeú), nearly three miles. There being no pathway, we were obliged to break through the high grass, trees, and thickly-scattered bamboo, which made it a fatiguing excursion; and after all we could only get a sight of the water by following the tracks of elephants, and other animals, whose ponderous bodies beat down everything before them. At length we came to an open dry shoal of sand, the bed of the river extending more than two hundred yards; we were told that the stream was here again called the Yeú." At another place, "We proceeded *winding* with the river. In several places we had the banks clear of trees, and covered with verdure* for some hundreds of yards, and the stream nearly as broad as the Thames at Richmond." Again—"Crossing the Yeú at a *dry spot*, we came to the banks of a large water, called Dammasak,† about five miles distant from the ford."

On their return to Tripoli in August they again crossed the Yeú, "now a considerable stream full of water, and running *to-wards* the Chad at the rate of three miles an hour." The Arabs, again, appeared to have a different opinion respecting it, calling it the Nile, which Denham supposed meant the river of Egypt. He says, again, "Bellal accompanied me down the river about nine miles, where, increasing in width about 100 yards, it flows into the Chad, with a strong and *deep*‡ current of water."

At the eastern end of the lake he had very vague accounts from the natives and from Barca Gana; the amount of which is, that the Bañr-el-Ghazál, which once received the waters of the Chad, and was a day's journey broad, is now dried up, and they knew of no other river communicating with the lake: that Fitri had a stream running out of it,§ and was not like the Chad, which every one knew was a *still water*.

Having now quoted all that Denham says respecting the nature of the lake, and the course of the river Yeú, I would merely ask whether it is not only possible, but very probable, that he might be mistaken in the current of a river which is described as very

* Qu. African verdure ten feet high (?).

† Clapperton found the water of Dammasak so deep, broad, and rapid that it required a whole day to pass it on rafts. This could not, therefore, be a still water, as one might infer from Denham's description. I mention this discrepancy to show how easily travellers may fall into error in that country. One account must be wrong. Denham's was in the beginning of the rainy, and Clapperton far on in the dry season.

‡ Rivers at their discharge are usually shallow. The depth is, at all events, incompatible with the strength of current which might have been in consequence difficult to ascertain.—A.

§ This is in opposition to the account of Major Laing's informant (see p. 299, line 7).

winding and difficult of approach, except by paths made by wild animals in the prickly bushes on its banks; a river that is in some places narrow, and in some a broad and noble stream, sometimes nearly dry, sometimes deep enough for camels to swim over, requiring rafts, as at Dammasak and two or three places mentioned by Lander, corroborating the testimony of Imhammed's "ill-constructed rafts," and deep enough for the huge hippopotamus to conceal himself at the bottom; a river, in fact, which in some places is said to be so sluggish as not to have any perceptible current, at others to run at the rate of three and a half knots, and which at one place, Dammasak, is described in an opposite manner by the two travellers? This perhaps is the strongest evidence of the difficulty of coming at the truth in that country. These arguments do not appear to me sufficient to overturn the reasons which I have given for believing that the waters of the lake Chad, collected from the lofty Kumri mountains, flow by the river Yeú through Wankarah and Boushi, to join the Chadda near Jakobah.

A strong presumptive evidence that this river flows *from* the lake may be also drawn from the description which is meant to serve the opposite purpose. Thus the farther it is from the lake the more important it appears, which may be in consequence of its having received an affluent from the Eyres (Aurás) mountains to the north* and the Mendefi range to the south; and certes, the increase in volume of a river is *below* its affluents. Again, the characteristics of the outlet of a lake may be said to be clearness, depth, rapidity, and singleness; those of the discharge of a large river are generally turbid, shallow, sluggish, and divided waters. And it is hardly probable that the Yeú would reunite the branches by which it surrounds Wankarah, in order to discharge itself by a single embouchure, in an alluvial country of its own formation, although it must be collected to pass between the Nora or Dushi hills, and the blue mountains which Clapperton saw to the south at Zangeia.

Of course it cannot be imagined that a river larger than the Kwara, which has been navigated to within seven days of Jakobah, can derive all its waters from the lake. It is most probable that near this city, where it takes a sweep to the westward, it receives another and a very large affluent from the Mendefi mountains. Indeed, a native informed Denham that having passed that range, he crossed a large river flowing between two high mountains, although his account of twenty days south would lead him far away from where Adamawa is supposed to be.

* The existence of such an affluent is noticed by Idrisi, p. 19.

Thus, if this hypothesis be proved, there is an uninterrupted navigation to the very centre of Africa; to the foot almost of the long-sought mountains of the moon, since Mr. Laird found two fathoms in the Chadda in the lowest part of the dry season: the natives and Idrisi say it is navigable for canoes throughout the year. Clapperton found some branches in Wankarah deep, where the water had already subsided six feet; and in addition to the length of the Chad, there is probably a chain of communicating lakes to the eastward. A great deal might be said on the importance of this easy access; but as I have already extended this paper beyond what I anticipated, I will conclude by putting the case in a very simple form. Clapperton was told that the Yeú had its origin near Jakobah, and Lander was told near Jakobah that the Chadda, which flows half a mile from that city, had its origin in a lake Chad. He had also crossed and re-crossed a large river flowing between these points. If these reports be true, and they were distinct and independent of each other, they must relate to one and the same river.

* * * * *

Subjoined are the positions of the principal stations at which I obtained astronomical observations on the banks of the Kwara and Chadda in 1835:—

	Lat. N.	Long. E.	
Cape Nun	4 21	5 53	
Eggabóh	5 28	6 25	
Okóh	5 54	6 38	
Adda Mugu	6 30	—	
Attáh	7 6	—	Variation.
Stirling	7 49	7 6*	19 51W.
Kattam Kárafí	8 7	—	
Fandah	8 12	7 42	
Egga Island	8 43	6 42	
Rabba	9 13	6 26	20 36W.

* The mean of many observations, with an artificial horizon, for longitude by three chronometers, and a lunar distance, gave the longitude of Stirling $7^{\circ} 3' E.$; by Jupiter's Satellites, $7^{\circ} 14' E.$; Idem, second observation, $7^{\circ} 16' E.$